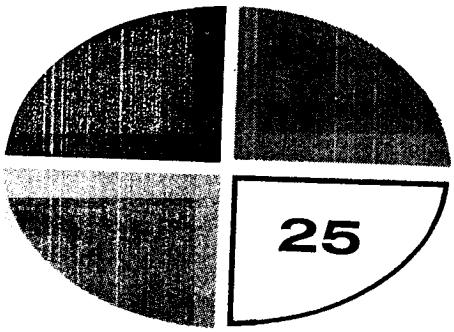

Fluctuations in National Income

All Mathematics would suggest / A steady straight line as the best,
But left and right alternately / Is consonant with History.

W. H. AUDEN

The ebb will take off what the tide brings in.

THOMAS FULLER

THE NATIONAL INCOME DIAGRAMS in earlier chapters are still photographs of the economy at a moment of time. They say that, if the expenditure schedule is in a certain position, the economy will be tending toward a certain level of national income. If the expenditure schedule shifts, the equilibrium level of income will change.

We must now examine how the expenditure schedule actually does shift over the course of time. It could conceivably go on rising steadily year after year. But in practice it does not do this. Every few years there is a setback, and expenditure and national income drop for a year or so before the upward climb is resumed. The task of this chapter is to follow these movements as if with a movie camera and to explore what determines their timing and shape.

We shall concentrate on *description, explanation,* and *prediction* of these swings in economic activity. What do they look like? What things go up most rapidly during an expansion, and what things fall most in recession? How can one explain the turning points in economic activity? Why does an expansion always reverse itself after a while instead of

going on upward forever? What progress has been made toward predicting future economic movements?

These questions are important. Elections are won or lost, businesses prosper or fail, people lose their jobs or find new jobs—all according to the swings of the business cycle.

DESCRIPTION

The nature of economic fluctuations can be judged from Figure 1, which is the chart shown in the introduction to Part Three. Note that every few years national output drops and unemployment rises. Then after a short time the movement is reversed. Output rises and unemployment falls.

Production and Unemployment, 1918–65

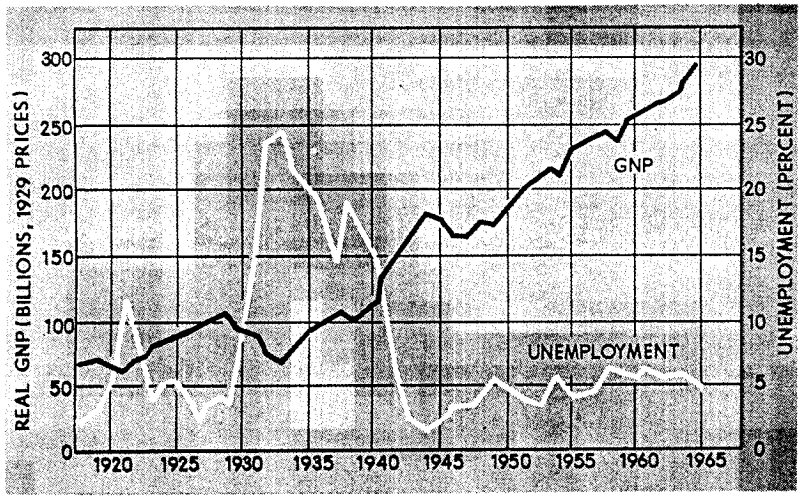

FIGURE 1.

These sawtooth movements are often called business cycles, but this can be misleading. "Cycle" suggests greater regularity than actually exists. If expansions and contractions followed each other at regular intervals, there would be no forecasting problem. The thing which keeps everyone sitting on the edge of his chair is uncertainty about when the next turn will come. Some economic expansions (1924–26, 1927–29, 1958–60) peter out after a couple of years. But one, the 1938–45 expansion associated with World War II, lasted almost 7 years; and the strong upswing which began in 1961 lasted more than 5 years. The average duration of an upswing is something like 3 years. But an average is not an insurance policy.

The term "cycle" also connotes a strong similarity among different

expansions and contractions. It suggests that we can find a single "business cycle theory" which will account for all of them. Few economists today would accept this view. There is a certain family resemblance among successive cycles. But each has individual characteristics, involving a combination of circumstances which will never recur in just the same form. Cycles differ in length, in size, in the combination of forces responsible for the upswing, in the reasons for ending of prosperity, and in the severity of the relapse.

It may be better, therefore, to speak of *economic fluctuations* or *fluctuations in national income,* which carries no implication of regularity or uniform causation.

One other problem of terminology: In popular usage, periods of economic expansion go by such varied names as "recovery," "prosperity," "boom." Periods of declining activity may be called "slumps," "recessions," "depressions." All this is rather confusing. Let us agree, therefore, to call a period of rising activity an *upswing,* and a period of declining activity a *downswing.* The point at which an upswing ceases and reverses itself we shall call the *upper turning point.* The end of a downswing is the *lower turning point.* A complete fluctuation, then, consists of a lower turning point, an upswing, an upper turning point, and a downswing. If this sounds less exciting than boom and slump, it has the advantage of saying exactly what we mean.

What goes on during one of these fluctuations? The most striking thing about them is the divergent movement of different elements in the economy. During a downswing some things fall a lot, others fall a little, while some go right on rising. In general, the things which fall most on the downswing also rise most on the upswing. It is necessary to say a bit about these differences in movement, since they provide some clues to why the fluctuations occur.

Some Things Fluctuate Widely

Among the items which show sizable fluctuations are:

1. *Business inventories* of raw materials, goods in process, and finished products. Businesses typically add substantially to inventories on the upswing and reduce them on the downswing.

2. *Machinery and equipment* expenditures also rise sharply on the upgrade and fall off during contraction. Note the wide fluctuations of this item in Figure 2.

3. *Consumer spending on durable goods,* notably automobiles, furniture, and household appliances. These purchases are postponable and are financed partly by borrowing. During a period of economic uncertainty some families will be unwilling or unable to borrow and will postpone their purchases to a more favorable time. Consumer spending on food, clothing, and services, on the other hand, has not declined in any of the downswings since 1945.

Economic Fluctuations Are Mainly Investment Fluctuations

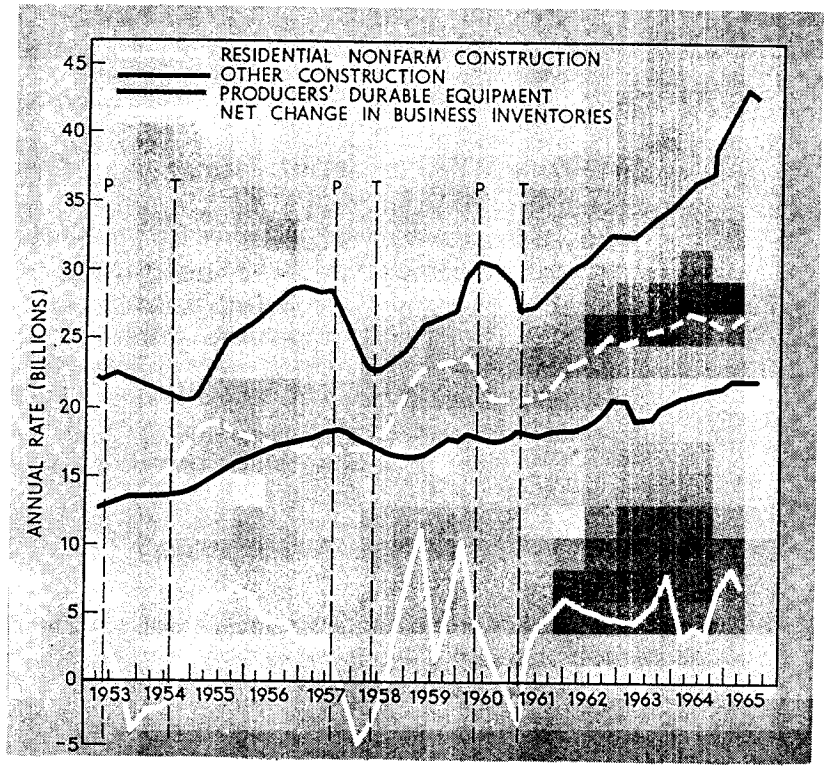

FIGURE 2. *P* indicates a cycle peak or upper turning point. *T* indicates a cycle trough or lower turning point. The dating is that used by the National Bureau of Economic Research.

4. *Production of durable goods.* With business spending on machinery and consumer spending on durable goods both falling, it stands to reason that output of durable goods must fall on the downswing. A downswing *is* mainly a decline in steel, metals, machinery, automobiles, and other durable goods industries. In recent downswings the total output of nondurable goods has dropped scarcely at all.

5. *Employment* rises and falls with production. On the downswing, several million people may be laid off completely and several million more reduced to working part time.

6. *Business profits* may fall by 25 percent or so in even a mild downswing, then shoot up the same distance or more during the next upswing.

7. *Tax receipts* of the federal government fluctuate for the reasons noted in Chapter 22. Even the mild downswings of the fifties brought drops of $5 to $8 billion in federal revenues, mainly because of smaller

1958–60, and 1961–66 brought increased revenues of close to $20 billion —in the last case despite the large 1964–65 cuts in tax *rates*.

8. *Interest rates*, particularly short-term rates, move up and down substantially over the cycle. This is partly a natural result of fluctuations in the demand for money, partly a reflection of monetary policy.

Some Things Always Go Up

Among items which fluctuate little with general economic activity, we may note:

1. *Government purchases of goods and services.* State and local government expenditures have risen quite steeply since 1945, and the rise has continued right through the downswing periods. Federal expenditures have had a milder uptrend, and also show little relation to general economic activity.

2. *Consumer spending on nondurable goods and services.* This has risen sharply during upswings, leveled off a bit during downswings, but shows no period of actual decline.

3. *Wage rates.* Wages have risen in bad years and good. The rise has been slightly less rapid during downswings than during upswings, but the difference is not marked.

4. *The price level.* Both the Wholesale Price Index and the Consumer Price Index have edged up gradually over the past 20 years. The advance slows down and sometimes stops for a while during downswings; but except for a mild drop in prices during the downswing of 1948–49, there has been no general price decline in the United States since 1938.

Much more could be said about the behavior of the economy during periods of expansion and contraction.[1] But perhaps we have said enough to set the stage for an analysis of why these fluctuations occur.

EXPLANATION

It would be satisfying to discover a general cause of economic fluctuations, a single source of the uneven heartbeat of the economy. But it has gradually become apparent that there is no one prime mover. Each upturn and downturn is complex and to some extent unique. One needs an eclectic rather than a monocausal approach.

There are two main things to be explained. First, after the economy has started moving up or down, why does it build up momentum and keep going in the same direction for a considerable time? Second and more difficult, why does the movement reverse itself after a while? After

[1] The great center of research on this subject is the National Bureau of Economic Research in New York. Anyone who wants to delve into detail will find a

production has been rising for several years, the production index levels off and then starts to decline. Why doesn't expansion continue indefinitely?

Investment: Autonomous and Induced

Since economic fluctuations are centered in the investment industries, we must look further into the short-run behavior of business investment. A basic distinction here is between *autonomous* and *induced* investment. The latter is capacity-oriented investment, occurring in response to changes in consumer demand. Demand for shoes rises 10 percent. If the shoe industry is presently operating at capacity, it will have to increase its capacity 10 percent to keep up with the expanding market.

Autonomous investment, on the other hand, is independent of current consumer demand. An example is investment in the early automobile factories. There was no prior demand for the product, since the product didn't exist. But some businessmen believed that, by starting to turn out this new product, they could tap a potential desire for it and develop an effective demand. New-product investment, then, is autonomous; and so is a good deal of the investment in cost-reducing improvements. Scientists and engineers are every day turning up improvements in production methods which are so profitable that they will be adopted even if consumer demand is not rising.

Autonomous investment could conceivably go on at a steady pace year after year, but this is unlikely to happen in practice. True, invention and innovation are going on all the time. But there are major and minor innovations. At one end of the scale is the small adjustment on a machine which increases its efficiency by 5 percent and which earns someone a $100 prize from the company suggestion system. At the other extreme are the inventions which led to the railroad, electric power production, telephone communication, and the automobile.

A major innovation gives rise to a wave of capital investment. First, a few pioneers demonstrate that the new technique is feasible and that the public will take the product at profitable prices. After this, imitators swarm into the new industry. Investment is heavy, plant capacity and output grow rapidly. But eventually the potentialities of the new industry are fully exploited, output tapers off to a plateau, and investment falls.

To sustain the upward momentum of the economy one needs a series of major innovations, following each other at regular intervals, so that as the force of one new development tapers off, there is something else to take its place. But this cannot be counted on. No matter how many well-financed research laboratories there may be, one cannot be sure of producing the equivalent of a new automobile industry every decade. Putting more money into scientific training and research should raise the *average rate* of invention, but it cannot make it completely regular.

The late Professor Joseph Schumpeter regarded the irregularity of autonomous investment as the main explanation of the business cycle. A cycle upswing is a period during which businessmen are swarming into one or more new fields of activity. As capacity catches up with demand for these products, prices and profits fall, new investment declines, and we enter the cycle downswing.

Swings in Induced Investment: The Acceleration Principle

If autonomous investment is likely to fluctuate, induced investment is certain to fluctuate. This can be explained by a simplified illustration. Table 1 shows a company operating in an industry in which technology is such that it takes $2 of plant and equipment to produce $1 of product per year. When the scene opens in 1961, the company is operating at capacity, producing $100 million of goods per year from a plant costing $200 million. We suppose that $10 million of the company's equipment wears out each year and has to be replaced just to keep capacity unchanged. This appears as *replacement investment* in column (4). To increase capacity requires additional *net investment*, shown in column (5). *Gross investment* is the sum of the two and appears in the final column.

We do not try to explain the sales figures in column (1). We simply assume that sales behave irregularly, first rising for a while and then falling. What we intend to show is that, because of the fluctuation in sales, there will be even larger fluctuations in investment. This is usually called *the acceleration principle*, because sales variations are magnified or "accelerated" into wider swings of investment.

TABLE 1

Hypothetical Illustration of the Acceleration Principle
(Millions of Dollars)

YEAR	SALES (1)	REQUIRED STOCK OF CAPITAL (2)	ACTUAL STOCK OF CAPITAL (3)	REPLACEMENT INVESTMENT (4)	NET INVESTMENT (5)	GROSS INVESTMENT (6)
1961	100	200	200	10	..	10
1962	110	220	220	10	20	30
1963	125	250	250	10	30	40
1964	135	270	270	10	20	30
1965	140	280	280	10	10	20
1966	140	280	280	10	..	10
1967	135	270	270	..	..	..
1968	125	250	260	..	..	..
1969	125	250	250	..	..	..
1970	135	270	270	10	20	30

In 1961, sales and capacity are in balance, so the company invests only the $10 million needed to replace worn-out equipment. In 1962, however, sales rise by $10 million, requiring new plant capacity of $20 million. Adding this to the $10 million of replacement gives gross investment of $30 million for that year. The course of events in subsequent years can be traced by working down the table. Note that net investment occurs only in years when sales are rising. Note also that in some years even replacement investment vanishes. Why is this? Because in these years sales are falling. The company can afford to let its plant wear out and its capacity shrink, since it still has enough (in 1968, more than enough) capacity to produce all it can sell.

Two points deserve special emphasis. First, the fluctuations in demand for the product produce magnified or accentuated fluctuations in gross investment. An increase of 25 percent in sales between 1961 and 1963 produces a *fourfold* rise in gross investment. A decline of less than 5 percent in sales from 1965 to 1967 causes gross investment to plummet to zero.

Second, the *level* of gross investment depends on the *rate of increase* in sales. In 1964, a slowing down of the rate of increase of sales as compared with the previous year causes an actual *drop* in investment. So the downturn of investment in column (6) *precedes* the downturn of sales in column (1), even though sales are the causal factor. This is the most interesting feature of the accelerator, and helps to explain why a business upswing may slow down and eventually topple over.

On the downswing, investment stays at zero while the capacity built during the boom gradually wears out. Note that wearing out of capacity will eventually require some replacement investment even if sales do not rise. Even if sales in 1970 remained at their depression level of $125 million, this would require plant capacity of $250 million. Since 1969 capacity is only $250 million and would wear down to $240 million by 1970, there will have to be replacement investment of $10 million in 1970 to meet production requirements.

The acceleration principle is applicable to other important categories of investment—for example, investment in housing. We could set up an example similar to Table 1 to show that a *decline in the rate of increase* of demand for housing will produce an absolute decline in house building. One can also generate fluctuations in business inventories by the acceleration principle. Since inventory fluctuations play an important role in business cycles, we give a simplified example in Table 2.

A common principle of inventory management is to keep inventories at a constant ratio to current sales. The department store in Table 2 tries always to maintain a 2:1 ratio. As its sales fluctuate, and it has unintended additions to or withdrawals from inventory, it will try to bring inventories back to the desired level. In period 1, the store is

TABLE 2

The Acceleration Principle Applied to Inventories

PERIOD	SALES DURING PERIOD	DESIRED INVENTORY AT END OF PERIOD	ORDERS TO ADJUST INVENTORY	ORDERS TO REPLACE GOODS SOLD	TOTAL ORDERS
1	100	200	0	100	100
2	115	230	30	115	145
3	130	260	30	130	160
4	145	290	30	145	175
5	150	300	10	150	160
6	140	280	−20	140	120
7	130	260	−20	130	110
8	130	260	0	130	130
9	140	280	20	140	160
10	150	300	20	150	170

order from manufacturers just enough to replace the goods it has sold, i.e. 100 units, as shown in the final column. In period 2, however, sales rise to 115 units, requiring an inventory of 230 units. To reach this level at the end of the period, it will have to order 115 units to replace the goods sold plus 30 units to build up inventory, or a total of 145 units. So an increase of 15 percent in the store's sales raises its orders to manufacturers by 45 percent—the accelerator once more.

The buildup of inventories continues through period 5. In period 6, however, sales drop and the accelerator goes into reverse. The store now wants to reduce inventories, to engage in *inventory disinvestment*. How does it do this? Simply by ordering fewer goods than it is currently selling. In period 6, it sells 140 units but buys only 120, so inventories drop from 300 to 280. Investments drop again in period 7. Just as on the upswing, a small change in sales produces a large change in orders to manufacturers.

Note that the turning points in new orders *precede* the turning points in sales. In period 5 sales are still rising, but the *rate of increase* has diminished. This brings a decline in new orders, because of the slackening of inventory investment. Again, in period 8, sales are at the same level as in the previous period. Orders begin to rise, however, because the store has stopped disinvesting in inventories.

By working the accelerator and the multiplier together, we can generate a "built-in" business cycle. True, there must be a push to set the machine going, an autonomous increase in spending from one source or another. Given this, the multiplier generates increased income and additional spending by consumers. As sales begin to increase, the

faster. This generates additional income, sales rise some more, and the rush to invest in inventories gains momentum. As manufacturing plants begin to near capacity, the plant and equipment accelerator takes hold, and investment rises some more. Through the multiplier this generates still more income, sales rise again, and so on and on.

To keep the upswing going, sales of finished goods must continue to rise. Moreover—and this is what really matters—they must *rise at a constant or increasing rate.* Any slackening of the rate of increase in sales, as we have seen, is sufficient to cause a decline in both inventory investment and plant and equipment investment. If this happens, the multiplier goes into reverse and income begins to fall.[2] Maintaining an economic upswing is rather like racing a motorcycle up a steep slope. As soon as the machine loses momentum, it is in danger of toppling over.

The Mechanism of Expansion

With these principles as background, let us look more concretely at what goes on during a typical cycle. Let us ask first how an upswing feeds on itself and develops enough momentum to continue for several years at a time. We break into the cycle just after the lower turning point. An upswing has begun and has continued long enough to convince the business community that recovery is underway. What happens from this point on?

1. The early stages of recovery are a good time to carry out investment plans. The banking system has excess reserves. Interest rates have tumbled during the downswing. Capital goods manufacturers have idle capacity so that one can get prompt delivery of machinery and materials. Prices and wages are as low as they are likely to be in the foreseeable future. Labor is plentiful. Thus for anyone considering an investment project, the economic environment is unusually favorable.

2. Who is in a position to invest on the upswing? Young industries whose markets are growing at a rapid rate are particularly important. Such industries know that they must build new capacity, and the only question is when. They may hold back on the downswing until they can gauge its seriousness, and also in the hope of benefiting from lower costs at the bottom. But once the upswing is clearly underway, there is no longer any reason to delay. These industries will come strongly into the market for capital goods, and expansion projects initiated at this time

[2] This impressionistic account can be made more precise by using some simple algebra. Well worth reading is the classic article on the subject by Paul A. Samuelson, "Interactions between the Multiplier Analysis and the Acceleration Principle," *Review of Economics and Statistics* (1939), pp. 78–88 (reprinted in the A.E.A. *Readings in Business Cycle Theory,* ed. Gottfried Haberler [Homewood; Ill.: Richard D. Irwin, Inc., 1944]). By selecting different values for the multiplier and the accelerator, one can generate a violent cycle which becomes progressively wider, or one which repeats itself indefinitely, or one which becomes progressively milder.

may take 2 or 3 years to complete. The length of the physical *gestation period* on large construction jobs is one reason why activity keeps moving upward for a considerable time.

Even industries which are not increasing capacity must do considerable investment. Old equipment wears out or becomes obsolete as superior machinery is developed. New products may require different types of equipment. This replacement and modernization investment is timed with some reference to economic conditions. When profits are falling and the future is unclear, many companies follow a "wait and see" policy. They let old equipment wear out and do nothing about it, which for the time being intensifies the downswing. The longer the downswing continues, the more of this postponed replacement demand is built up for the future. Once the upswing is underway, this potential demand becomes effective and helps raise the level of investment.

3. Some industries have cycles of their own. Building construction seems to follow a cycle of 15 to 20 years in length. If an economic upswing occurs at a time when the building cycle is also on the upgrade, the vigor of construction activity adds momentum to the upswing. But if the building cycle is in a contraction phase, this acts as a drag on the economy. It makes the general upswing shorter and weaker than it would be if building were also expanding.

4. Another feature of the early upswing is a rise in inventory investment, explainable by the accelerator principle. As sales of finished goods begin to rise, there will be an inventory buildup all along the line from retailers back through manufacturers to raw material suppliers. This can add several billions a year to total business investment.

There is a further reason for a rise in inventory investment. In industries where raw materials are important and where material prices fluctuate widely, a manufacturer is unavoidably involved in price speculation. A tire company is partly a producer of tires, partly a speculator in rubber prices. So as soon as an upswing is underway many companies, reasoning that material prices are bound to rise, will order unusually large amounts in order to "beat the price rise."

5. With additional investment going on for these reasons, the upswing is clearly on solid ground. Part of the increased income generated in the capital goods industries is spent on consumer goods, thus raising demand and output in those industries. Increased employment in consumer goods production generates still more income, most of which is respent on the next round; and so on through the familiar multiplier process. Because of the large size of the consumer goods sector, the *absolute* increase in consumption during an upswing is typically larger than the increase in investment, even though it may have been investment which provided the initial push.

6. As the level of income rises, more and more industries find themselves operating close to capacity and begin to consider whether

they shouldn't build new capacity. The rising cost of investment during a boom operates as a deterrent. But this is typically outweighed by the facts that the sales outlook is good and that companies are making substantial profits which can be plowed back. There is also a competitive element at work. A company usually aims to keep at least its present share of sales in its industry, and preferably to gain a larger share. This means that its expansion plans must keep pace with those of rival companies. If demand for the industry's products is expected to be 20 percent higher 5 years from now than it is today, there will be a competitive scramble to see who can "get there fastest."

Thus we get *induced* investment, operating in the manner of our accelerator example. Because of the high mechanization of many industries, the effect is substantial. During the strong upswing of 1961–65, for example, sales of new machinery rose from about $29 billion in 1961 to $45 billion in 1965, or more than 50 percent. Construction of plants, stores, office buildings, and the like also rose by about $5 billion.

These cumulative, mutually reinforcing increases in consumption and investment readily explain why the pendulum keeps swinging in the same direction for several years at a time. It is harder to explain why the upswing eventually slows down and reverses itself. Just when people have become confident about continued economic expansion, the rug is pulled from under them, and the economy heads downward into recession.

Why is this? Must the boom come to an end? Couldn't a downturn be prevented, if only we were sufficiently clever? In the present state of knowledge the answer seems to be no. To explain why is the next stage in our story.

The End of Prosperity

We saw earlier that, to the extent that the upswing depends on the accelerator, aggregate demand must keep rising *at a constant or rising rate*. This may well happen, at least for a while. But it may also not happen. Some of the components of total spending may stop rising, or may rise more slowly than before. Consumers may decide that they don't like this year's automobile models and may reduce their spending on durable goods. A drop in federal spending, unaccompanied by a drop in tax rates, can break the back of a boom. This was a factor in the downturn of 1953. As the Korean War came to a close, federal purchases of goods and services were cut by about $15 billion between the first quarter of 1953 and the first quarter of 1954. This was an unusual event. But even a failure of government expenditure to rise at the same rate as tax revenues are increasing will have a depressing effect on total spending.

Most likely of all, however, is that business investment will eventually lose momentum and rise more slowly than before. Autonomous investment vagaries of its own, as we have seen. The reasons for an eventual slackening of investment are to some extent built into the pattern of the previous expansion. Several points deserve mention:

1. In the early stages of an upswing, there is usually heavy inventory investment to restore the normal ratio of inventories to sales. But once this has been accomplished, the rate of inventory investment slackens. Now if businessmen increased inventories this year by $10 billion, and if next year they increase them only $5 billion, this amounts to a *cut* of $5 billion a year in investment. A careful look at Figure 1 suggests that this typically happens during the last half of an upswing.

The same analysis applies to replacement and modernization of equipment. There is a tendency to delay this kind of investment on the downswing because of the uncertain business outlook. Thus the economy enters the upswing with a backlog of deferred demand. Once the upswing is underway, there is no longer any reason for delay. Businesses rush to make up for lost time. Orders for new equipment are placed at a rapid rate. The backlog of demand begins to shrink, and after a couple of years may be largely exhausted. This means a drop in demand for machinery and related items.

2. Another prominent feature of the upswing is a rush to increase plant capacity in industries with a strong uptrend of demand. But future movements of demand are always conjectural, and plant expansion may undershoot or overshoot the mark. Overshooting is especially likely in competitive industries where numerous firms are trying to estimate both the increase in total industry demand and the share of the market which they can hope to capture. If many firms are overoptimistic, total plant capacity can easily outrun the increase in demand. Since plant construction takes time, it may be several years before this becomes apparent. But as more and more plants come into operation and it becomes apparent that the industry is overexpanded, further plant construction will cease. This is an additional reason why investment, after rising for a few years, may weaken abruptly and unexpectedly.

3. Investment is a physical as well as a financial process. The feasible rate of investment is limited in the short run by the capacity of the capital goods industries, by the supply of metals, machinery, building materials, skilled construction labor, and so on. These industries enter the upswing with much idle capacity, and so for a while their production can expand rapidly. If the upswing carries to the point at which the capital goods industries are working to capacity, however, the rate of increase in investment must decline.

Capacity limitations do not compel an actual downturn of investment. But they can compel a drop in the rate of increase. This leveling off of investment must fairly quickly, after the multiplier has done its work, mean a leveling off of GNP. And this has awkward implications

upward pressure on the price level. If it does, another unstable and reversible element enters the scene. Part of consumer and business spending now becomes an effort to beat the next price increase. It depends on an expectation of further price increases in the future. If anything happens to shake this expectation, this "scare buying" will diminish or disappear; and the overbuying which was induced by fear of price increases will be offset by underbuying for some time.

5. How far have we gotten in demonstrating that the boom contains the seeds of its own destruction? We have shown that part of the investment on the upswing is of a sort which naturally goes into reverse after a while. Inventory investment, deferred replacement demand, and buying based on expectation of price increases are all of this character. Competitive overexpansion of particular industries during the upswing may lead, when it is eventually discovered, to a drop of investment in those industries. If the monetary authorities become concerned about rising prices and apply the credit brakes, this can also check the rise of investment.

Thus investment *may* level off or decline even before the capital goods industries are working at capacity. If the upswing carries these industries to capacity, investment *must* taper off for physical reasons. And this implies that the increase in GNP will also taper off.

But what is wrong with this? Why can't the economy taper off at a high level and move along a gently rising plateau? There are at least two reasons. First, a reduced rate of increase in consumer demand cuts induced investment via the acceleration principle. Second, most businessmen do not believe that the economy can hold indefinitely to a stable level of activity. They do not believe in "prosperity plateaus." They believe in cycles, having been conditioned to this by a century of economic history. As soon as an expansion begins to level off, many businessmen say "Ah! We are nearing the end of this upswing. The sensible thing now is to go slow on our investment plans and see what happens." As this impression spreads, it helps to bring on the downturn. And then everyone can say, "How clever we were. We knew it all the time."

Big Downswings and Little Ones

The growth of production and employment is interrupted every few years by a downturn. Since 1850 there has been only one peacetime upswing which continued longer than about 4 years,[3] and many were cut short after 2 to 3 years. But some downswings are long and severe, while others are brief and mild. In the Great Depression of the thirties, GNP dropped by about 30 percent between 1929 and 1933, and full recovery

[3] Geoffrey H. Moore (ed.), *Business Cycle Indicators* (Princeton, N.J.: Prince-

was not achieved until the war boom of 1941–45. In the four downswings between 1946 and 1965, on the other hand, GNP never dropped more than 5 percent. This is sometimes taken as indicating that major downswings are no longer possible in the American economy.

What makes the difference between a small downswing and a large one? One important factor is the stage of the building cycle, which has its own slow-moving pattern cutting through the fluctuations of general business. If building construction is moving upward, one can count on a sizable volume of investment in good years and bad. Suppose all other investment dropped to zero. Then national income could drop only to the point at which saving equaled building investment (or, more realistically, building investment plus the federal deficit). This sets a floor to the downswing, and the higher the level of building activity the higher this floor will be.

But suppose the economy is in a downward phase of the building cycle. Then building activity provides less support, and downswings can go farther before hitting bottom. This was the situation in the 1930's. The building cycle reached a peak in 1925 and then turned down. By the time of the general downswing in 1929, building had fallen too low to provide much support. Throughout the fifties, on the other hand, building construction was high and rising. Each time a downturn occurred, the continued strength of building activity helped to arrest the downswing.

Another important factor is the uneven occurrence of major investment opportunities. A major downswing could occur because of a temporary lack of major inventions and innovations. It has been suggested that this may have happened after 1929. Heavy investment in electric power and automobiles helped to sustain prosperity during the twenties. But as these industries moved toward maturity, no new industries of equal importance appeared to maintain the momentum of investment. The downturn of the building cycle in 1925 served as an additional drag. Hence the severity of the 1929–33 downswing.

Contrast with this the situation during the fifties. By this time many important discoveries dating back to the thirties and forties were ripe for commercial application. The list includes automation in factory and office, computers and other electronic devices, applications of atomic energy, jet aviation and rocketry, major developments in chemicals and petrochemicals. These areas have generated a large volume of autonomous investment, oriented toward long-term development and largely independent of current demand. This flow of assured investment, plus the high level of construction activity, has sustained national income during the postwar period. Downswings have not been able to develop momentum. In each case the economy has hit bottom and rebounded after 9 to 12 months.

out of the air but are not far from the mark for recent years. Suppose the pattern of investment at the upper turning point is as follows:

Residential construction	$20 billion (annual rate)
Autonomous business investment	25
Induced business investment*	25
Inventory change	5
Total investment	$75 billion (annual rate)

* This is a gross investment, and includes all items which may be subject to short-term cyclical influences. It includes replacement and modernization of equipment as well as plant expansion based on expectations of rising demand. Our assumption that half of business investment is sensitive to short downturns and half is not is arbitrary. But it may be a reasonable estimate for this period.

Suppose that on the downswing the inventory figure drops to −5 billion, and that induced investment drops to 20 billion. House building and autonomous business investment remain unchanged. Thus total investment declines by 15 billion. If the marginal propensity to spend is 0.5, then the multiplier is 2 and GNP will fall by 30 billion. At present GNP levels, this would be a fall of about 5 percent.

Suppose, on the other hand, that house building and autonomous business investment were declining year by year. This would lower the automatic "floor" under the economy, and permit deeper and longer declines in GNP. It is these two components of investment which really make the difference.

Concerning the probable behavior of the American economy during the next decade or two, one can only speculate. There is little evidence that private investment is inherently more stable than it used to be. The chief difference from earlier decades is the reduced value of the multiplier, due mainly to the greater importance of federal taxes and transfer payments. Recent estimates put the value of the multiplier in the neighborhood of 2, whereas pre-1940 estimates were usually between 3 and 4. Thus a $10 billion drop in investment now generates only a $20 billion decline in GNP instead of a $30 or $40 billion decline. This fact, plus the likelihood that any federal administration would move vigorously to combat a major downswing, warrants a belief that depressions on the 1929–33 scale are now impossible. But medium-sized downswings, larger than anything we have seen since 1940, are still within the bounds of possibility.

PREDICTION

What's going to happen next on the economic front? Everyone

sport of journalists, commentators, sales managers, and public officials. The quality of these forecasts varies greatly. Many are so vague or loaded with weasel words that the forecaster can hardly lose, but by the same token the user of the forecast can hardly benefit.

A good way to separate the men from the boys is to see whether a forecast uses numbers. Economics is a quantitative subject, and masses of current statistical information are now available. Unless an economic writer indicates a grasp of this material and is willing to spell out his predictions in figures, he cannot be taken seriously.

The more reputable methods of prediction may be classified as: (1) barometric forecasting; (2) analytical forecasting using the GNP framework; (3) econometric forecasting, which is also analytical but somewhat more complicated.

Barometric Forecasting

This method does not require any theorizing about the causes of economic fluctuations. It is purely inductive. It rests on the observation that things have happened in a certain way in the past and a surmise that they may happen similarly in the future.

The best-known example is the work of the National Bureau of Economic Research. Research workers at the Bureau have analyzed the movement of several hundred economic variables over a long period in the past, beginning in some cases as early as 1870. Particular attention has been paid to upper and lower turning points in each series, which presumably reflect the rhythm of overall economic fluctuations. From an examination of this material, the Bureau has established a precise year and month for each upturn and downturn in general economic activity. By comparing the turning points of a particular series with that for business in general, one can discover whether the series typically reverses itself earlier than general business, or at about the same time, or later.

On this basis, the series have been classified into three groups: (1) *Leading series,* which typically turn up and down in advance of general business. Included in this group are business failures, stock prices, new orders for durable goods, building contracts, average work week in manufacturing, new incorporations, and sensitive wholesale prices. (2) *Roughly coincident series,* which turn at about the same time as general business. This group includes employment, unemployment, industrial production, GNP, freight carloadings, corporate profits, and wholesale prices (except farm and food products). This amounts to saying that these are the series to which the Bureau attaches greatest weight in *defining* the turning points in general business, and also that these major indicators move quite closely together. (3) *Lagging series,* which move somewhat behind the swings of general business. Among this group are personal income, retail sales, consumer installment debt, [illegible]

How can this kind of information be used by the economic forecaster? It is no use to look at the lagging series, because by the time they move, the horse is already out of the barn. Even the coincident series do not help on prediction, though they can *confirm* a turning point 2 or 3 months after it has occurred. The only way to obtain an advance tip-off is to look at the leading series, which normally move ahead of general business. If five or six of these have already turned up or down, one can conclude that a turning point in economic activity is near.

TABLE 3

Average Timing of Selected Leading Series before 1957, and Their Timing in the 1960–61 Recession

SERIES	FIRST YEAR COVERED	MEDIAN LEAD (−) OR LAG (+) IN MONTHS Peak	Trough	LEAD OR LAG AT 1960–61 Peak	Trough
Liabilities of business failures*	1875	− 6.5	−7	−12	−8
Industrial stock prices	1871	− 3.5	−6	−10	−4
New order, durable goods	1920	− 5.5	−2	−11	−1
Residential building contracts	1915	−14	−6	−17	−2
Commercial and industrial building contracts	1919	− 8	−2	no contraction	
Average work week, manufacturing	1920	− 6.5	−4	−12	−2
New incorporations	1860	− 2	−6	0	−3
Sensitive wholesale prices	1892	− 2	−1	− 6	−2

Sources: Data to 1957 are from R. A. Gordon, *Business Fluctuations* (2nd ed.; New York: Harper & Bros., 1961). They were compiled originally by Geoffrey H. Moore of the National Bureau. Leads for 1960–61 were calculated by the writer, using the Bureau's standard dates of May, 1960, for the upper turning point and February, 1961, for the lower turning point.

* This series is used in *inverted* form. Failures *rise* as business activity *falls*, and vice versa. Hence leads and lags refer to the inverted series.

Since particular interest attaches to leading series, their past performance is shown in Table 3. The figures in the first two columns show the *average* number of months by which each series has been ahead of general business at downturns and at upturns. These averages, unfortunately, conceal a good deal of variation from one cycle to the next. A series which shows an *average* lead of 4 months at the downturn may vary all the way from a lead of 12 months to a lag of 4 months in different cycles. Blind reliance on any one indicator can be quite misleading. A particular series will sometimes "flash the signal" a good deal too early,

There are two main reasons why a series may be a leading series: (1) It may measure something which foreshadows a change in productive activity. An increase in building contracts normally means a rise in construction work a few months later. A rise in new orders for durable goods leads directly to increased activity in the metals and machinery industries. An increase in incorporations means that the new businesses will shortly be spending money on plant and office facilities.

2. A series may express the combined opinion of experienced observers about what lies immediately ahead. When large investors become convinced that a downswing is "bottoming out" and will soon end, they will buy securities immediately to get in at the bottom. Thus the stock market will turn up before the upturn in physical production. The same is true of raw material prices and other items included in the "sensitive wholesale price" index.

The barometric approach rests on economic logic. There are good reasons why the leading series *are* leading series on the average. But the method also involves certain weaknesses:

a) The variability in the behavior of individual series has already been noted. A series which is "well-behaved" most of the time may deceive you in a particular case by reversing itself too early or too late.

b) Most economic series show small, irregular fluctuations from month to month. If an index declines in a particular month, one cannot tell immediately whether this is a real turning point or a minor variation which will be reversed next month. It may take two or three months to be reasonably sure, and this cuts into the forecaster's precious margin of time.

c) In addition, most series are not available to the public until 2 or 3 months after the period which they cover. This is one reason why business organizations often collect their own indexes, which may have limited coverage but can be gotten out faster than the official government figures.

Thus even if a leading series does genuinely lead in a particular case, the forecaster is bound to be several months behind in reaching a firm conclusion.

Note also that this method predicts only the turning points. With good luck it may predict a future downturn, or at least confirm the downturn soon after it has occurred. But it says nothing about the probable depth and duration of the downswing. Similarly for an upswing. Barometric methods are thus useful mainly for short periods of time in the vicinity of a turning point. At other times, which means most of the time, analytical methods will be found more useful.

The last two columns of Table 3 show how one would have fared by using this method to predict the business peak of May, 1960, and the trough of February, 1961. The indicators would not have been very

down at all. Most of the remaining series turned down about a year in advance of the general business decline. They gave the right signal but a good deal too early. The indicators performed better on the upturn, most of them turning up 1 to 3 months ahead of the general business recovery.

Analytical Forecasting

This approach rests on the theory of income determination developed in Chapter 20. It starts from the components of total demand and the relations among them. It consists of estimating the components of demand, combining them into an estimate of GNP, and then cross-checking the results for consistency. The outcome is a detailed forecast of GNP and its main components, usually by calendar quarters, for a year or so ahead.

While the essence of the approach is easily stated, its application is more difficult. One difficulty is that "everything depends on everything else." Business investment in the next quarter will have some relation to consumer spending. But consumer spending depends on income, which depends partly on business investment. It seems that we cannot estimate any one component of GNP without already knowing the others.

There are two ways of breaking out of this circle. One way, quite important in econometric forecasting, is to use *lagged relationships.* If consumer spending in the *next quarter* depends on disposable income in *this quarter* (which we already know), we can make an independent estimate of this item. Similarly, if business investment next quarter can be related to business profits over the past four quarters (which we already know), we are on firm ground.

Another thing we can do is to take some components of GNP as independent of everything else, at least as a starting point. Obvious candidates include government spending, business investment, and exports. Let's see how far we can get by first estimating these items, then working back to consumer income and expenditure, and then cross-checking the results.

Look first at *government purchases of goods and services.* Each January the President sends Congress his proposed budget for the fiscal year running from July 1 of that year to July 1 of the following year. By midsummer, Congress has finished working over the items in the budget and has determined the final figures. We are then on reasonably firm ground for four quarters ahead.

There is no central source of information on state and local government expenditures. But this item can safely be projected on the basis of past trends. Over the past decade it has risen consistently at about 10 percent per year.

The most important *investment* item is business expenditures on

construction, and machinery purchases. There are several indicators of future investment plans. Early each year the Department of Commerce and the Securities and Exchange Commission send a questionnaire to a large number of business concerns asking how much they expect to spend on plant and equipment during the year. The results are published in the March issue of the *Survey of Current Business.* The results of this survey typically come close to the amount actually spent during the year. The margin of error averages about 3 percent, and in some years has even been less than 1 percent. Information on recent business profits, on construction contracts awarded, and on new machinery orders serve as useful supplements to the Commerce-SEC results.

Residential construction moves more erratically. Efforts to predict its movement on the basis of consumers' incomes, surveys of consumers' intentions, and surveys of builders' plans have not been very successful. Availability of mortgage money, and the prevailing interest rate on mortgages, seem to be important factors. Construction contracts awarded provide some indications for the near future. Something can also be learned by analyzing basic factors affecting the demand and supply for new housing, such as the marriage rate, migration rates from country to city and city to suburbs, the existing supply of unsold new houses, the vacancy rate in apartment buildings, and the price of old houses.

Inventory change is an important component of investment but is also difficult to predict. *Fortune* magazine and Dun and Bradstreet make quarterly surveys of companies' inventory plans. One can also look at sales by manufacturers and retailers, the ratios of present inventories to sales, and how the current ratios compare with those which have been normal over the past. If the current inventory/sales ratio is considerably above normal, for example, there may be an effort to reduce it in the quarters ahead.

The Department of Commerce prepares forecasts of U.S. *exports and imports,* which are reported frequently in the *Survey of Current Business.* The International Monetary Fund and other international agencies also take an active interest in this field. Exports are inherently difficult to predict, since they depend on income levels throughout the world as well as on our competitiveness in foreign markets. But this is a small item in our GNP accounts and moderate errors are not important.

After estimating each of these items, we add them up and find that the total comes to, say, $200 billion. The next step then is to incorporate this into a projection of total GNP, including consumer expenditures. We know that consumption is closely related to disposable income. Something like 92 percent of income is normally spent and the remainder is saved. We also know that disposable income is a good deal smaller than GNP. Government takes a large amount in taxes, though part of this comes back in transfer payments. Business savings are another substan-

payments, corporate profits, and business savings. On the basis of this we conclude that disposable income will be, say, 70 percent of whatever GNP turns out to be.

From here on we proceed as follows:

$$\begin{aligned} \text{GNP} &= \text{consumption} + \text{investment} + \text{government expenditure} + (\text{exports} - \text{imports}) \\ Y &= C + I + G + (E - M) \\ \text{but } I + G + (E - M) &= 200 \\ \text{hence } Y &= C + 200 \\ \text{or } C &= Y - 200 \end{aligned} \tag{1}$$

We also know that $C = 0.92Y_d$, where Y_d is disposable income. And we know that disposable income is 0.70 of Y. Thus

$$\begin{aligned} C &= 0.92Y_d \\ &= 0.92(0.70Y) \\ &= 0.644\ Y \end{aligned} \tag{2}$$

Solving equations (1) and (2), we find that $Y = 561.8$ billion and $C = 361.8$ billion. This becomes our prelimininary estimate for the period we are considering.

This estimate still needs cross-checking and revision. It rests on economic relationships which, on the average, have held true in the past but which may need to be modified for the immediate future. In particular, it is wise to make an independent projection of consumer expenditure based on past trends and to see how this compares with the total of 361.8 billions obtained above. Separate estimates are usually made for consumer expenditure on nondurable goods and services, which is a very stable item, and expenditure on durable goods, which is more volatile. Within the durable goods category, automobile purchases are so variable and important that they deserve a separate estimate.

An annual survey of consumers' buying plans conducted by the Survey Research Center of the University of Michigan, and a more recently developed survey by the Census Bureau, provide help on this front. Results of these surveys are published in the *Federal Reserve Bulletin* and have considerable predictive value. What consumers say they are planning to do about buying new cars, for example, yields a more accurate forecast of car sales than one would get by looking at consumer income alone.

There are also cross-checks of the "where is the money coming from" variety. Estimated business investment can be set against the funds available from depreciation allowances, retained earnings, and possible reduction of cash reserves. Any uncovered balance will have to be met by security sales to the public and bank borrowing. If the results indicate a substantial rise in business borrowing, this may push up interest rates.

It is useful to compare estimated government receipts and expenditures. Suppose the preliminary estimates indicate a large federal deficit. This suggests several possibilities: there may be something wrong with the estimates; or the estimates may be correct, but the size of the prospective deficit may lead to efforts to reduce it; or the deficit may actually materialize, in which case Treasury sale of securities to cover it will affect interest rates, bank reserves, and availability of credit to private borrowers.

After making these checks, one may want to revise some of the items in the preliminary estimate. The GNP equation must then be solved again to produce a new forecast, which can be checked by the same methods as the original estimate.

The results to this point are all in dollar terms. To judge the probable movement of physical output and employment, we must make a further estimate of changes in the price level.

It is helpful to examine the estimated level of GNP relative to the physical capacity of the economy. The closer the projected level of GNP is to full capacity, the more reason to expect that part of the rise will take the form of price increases rather than output increases. One can also see whether there have been recent price increases in metals, raw materials, and other basic products which will gradually work their way through to the finished goods level. It may make a difference whether important labor contracts are expiring and whether sizable wage increases are in prospect. Agricultural prices require a separate estimate, since they move differently from industrial prices.

Out of all this comes an estimate that the general price level will be, say, 2 percent higher a year from now than it is today. If the dollar value of GNP has been estimated at 5 percent higher, this means physical output will rise 3 percent over the year. Finally, the output estimate can be converted into an employment estimate on the basis of past relationships between volume of output and man-hours of labor required to produce this output.

Econometric Forecasting

This is an attempt to make analytical forecasting more precise by applying statistical techniques to quantitative information about the economy. It focuses on the major GNP categories, especially the components of consumption and private investment. The problem is to estimate each of these so as to get a close approximation to total GNP. The analysis uses quarterly rather than annual data, since the purpose is to predict short-term movements in the economy; and the forecasts usually run no more than two to four quarters ahead of the present.

Suppose we wish to estimate household consumption for the next quarter. Theory suggests that the change in consumption will be related

indicate the change from one period to the next, we write a relation of the form

$$\Delta C = a + b\,\Delta Y.$$

Here ΔC is the dependent variable and ΔY is the independent variable on which we are relying to "explain" ΔC. The constants a and b are termed *parameters.*

Now we come to the crux of the matter: what values for a and b will give us the most accurate prediction of ΔC? At this stage we resort to past experience. Suppose we have quarterly figures for the years 1950–65, giving us 64 observations of ΔC and ΔY. We proceed to "fit" our consumption equation to these figures, using regression techniques which you may have encountered in statistics courses. This yields values for a and b which, if we had used them over the years 1950–65, would have given a more accurate prediction of ΔC than we could have gotten with any other values. The regression analysis also gives us measures of the variance between our predicted ΔC's and the true values, measures of "goodness of fit."

If the fitted equation yields close predictions of ΔC, we may stop at this point. But this would be unusually good luck. More probably, there will be a degree of variance which makes us uneasy about using the equation to forecast the future. We will then try to reduce the variance by altering the form of the consumption equation—for example, by adding other independent variables which might logically have some bearing on consumption. Finally, after a good deal of such tinkering, we get an equation with a fit which we consider good enough for operating purposes.

We repeat this procedure for each of the other dependent variables in our system—plant and equipment investment, housing construction, inventory changes, and so on. When we have a satisfactory equation for each of these, our model is set up and ready to operate.

Forecasting models may be very detailed or quite aggregative. They may deal with a few global totals or may break the economy down by industries and types of products. Finer subdivision yields greater precision but also involves more work. So where you stop is a matter of judgment, and also depends on how much money you have for statistical assistants and computer time.

One model of the American economy which is now in experimental use contains 65 variables and upward of 200 equations.[4] But for illustrative purposes we may select a simpler aggregative model containing only five equations, developed by Professor Irwin Friend and others at the University of Pennsylvania.[5]

[4] See Gary Fromm and Lawrence R. Klein, "The Brookings–S.S.R.C. Quarterly Econometric Model of the United States," *American Economic Review,* May, 1964, pp. 348–61.

The notation is as follows: Y = GNP, C = consumption, H = residential construction, HS = housing starts, PE = plant and equipment expenditures, PE^e = *expected* PE expenditures as revealed by surveys, I = inventory change, S^e = *expected* business sales, G^1 = government expenditures plus net exports (taken as determined independently outside the system). The model is set up for 6-month periods. The symbols ΔC, ΔH, and so on refer to *changes* from one period to the next. The subscript -1, such as PE_{-1}, refers to the *level* of plant and equipment investment in the previous period. A *change* with a subscript -1, such as ΔC_{-1}, refers to the *change* between the last two periods.

The equations in the model are as follows (all figures are in billions of 1954 dollars, seasonally adjusted):

$$\Delta C = 2.18 + .37\,\Delta Y + .10\,\Delta C_{-1} \tag{1}$$
$$\Delta H = .35 + .06(\Delta Y - \Delta Y_{-1}) + .58\,\Delta HS_{-1/2} - .16\,\Delta PE^e \tag{2}$$
$$\Delta PE = -.82 + .08(\Delta Y - \Delta Y_{-1}) + .63\,\Delta PE^e \tag{3}$$
$$\Delta I = 1.51 + 0.25\,\Delta S^e - 1.15\,I_{-1} + 1.70\,\Delta PE^e \tag{4}$$
$$\Delta Y = \Delta C + \Delta H + \Delta PE + \Delta I + \Delta G^1 \tag{5}$$

The consumption equation (1) requires no comment. In the housing equation (2), the largest single influence is advance information on the number of housing starts in the recent past. There is also, however, an accelerator term $(\Delta Y - \Delta Y_{-1})$, which depends on whether the rate of GNP increase this period is *higher* than it was last period. And there is a negative (inverse) relation between housing construction and PE expenditure. The logic of this is that heavier plant and equipment expenditure means greater business borrowing and higher interest rates, and that higher mortgage rates will reduce consumer willingness to start new houses.

The plant and equipment equation (3) relies heavily on survey information about how much businessmen expect to spend on plant and equipment; but it also has an accelerator term $(\Delta Y - \Delta Y_{-1})$ for understandable reasons. The inventory equation (4) makes the change in inventory investment depend partly on sales expectations, partly on business expectations in general (PE^e being taken as an indicator of the general business outlook), and partly on the level of inventory investment in the last period. This last relation is negative—the higher was inventory investment last period, the smaller will be the expected increase in inventory investment this period.

[5] Irwin Friend and Paul Taubman, "A Short-term Forecasting Model," *Review of Economics and Statistics,* August, 1964, pp. 229–36. The brief account given here is necessarily rough, and those interested in techniques should consult the original source.

The last equation (5) says simply that the increase in GNP is the sum of the increases in its components.

The values of the parameters were obtained by regression analysis, using figures for the years 1953–60. The model was then used to make forecasts for the years 1961–63, i.e., years *beyond* the period on which the model was based. This, of course, is the proof of the pudding. A carefully constructed model will necessarily give a good fit to experience during the years used in constructing it—you can make it do so, by sufficient tinkering. But how well does it perform when you move out into the uncharted sea of the future? The results of this experiment for several half-year periods are summarized below:

	ΔY		ΔC		ΔI	
PERIOD	PREDICTED	ACTUAL	PREDICTED	ACTUAL	PREDICTED	ACTUAL
1961 (first)	3.2	0.0	3.5	1.8	−1.6	−1.4
1961 (second)	19.7	18.1	9.7	6.5	4.9	5.9
1962 (first)	16.9	14.1	9.1	7.6	1.0	1.4
1962 (second)	5.6	7.6	5.0	6.3	−2.7	−3.3
1963 (first)	9.1	8.8	6.2	5.4	−1.3	0.9

	ΔH		ΔPE	
PERIOD	PREDICTED	ACTUAL	PREDICTED	ACTUAL
1961 (first)	0.3	− .9	−1.7	−1.8
1961 (second)	1.7	2.2	1.5	1.5
1962 (first)	0.8	−0.1	2.4	1.4
1962 (second)	0.3	1.3	1.4	1.7
1963 (first)	0.9	−0.3	0.4	−0.4

These results look reasonably good, and better than most forecasters have been able to do by the impressionistic methods described earlier. There is reason to expect that, with more effort and experimentation, the precision of this and other models can be further improved. But lest the reader conclude that economists now have a surefire way of reading the future, a few cautions are in order:

(1) The accuracy of forecasting models hinges on the basic assumption that the future will resemble the past, that parameters estimated from data for past years will continue to be reliable in future. Any marked change in reactions within the economy will reduce forecasting accuracy. This difficulty can be met in part by reestimating and changing the parameters at frequent intervals. Most econometric model builders do precisely this, which is why their work is never done.

(2) The forecast of GNP will be more accurate than the forecasts of its components, since errors in opposite directions will partly cancel each other. Very often, however, it is one of the components in which we are really interested. Note the uneven performance of the Friend model in estimating residential construction—apparently an unusually tricky branch of the economy.

(3) These models are designed to make predictions for the very near future, from 3 months to 12 months ahead. If we want a long-term projection of what the economy will look like in 1980, a different apparatus is required.

(4) Like all other methods, econometric forecasting is likely to give better results during a sustained upswing or downswing than it gives at the turning points. Yet the turning points are of greatest practical interest. Such is life!

SUMMARY

1. Fluctuations in national income are concentrated in the various components of business investment.

2. The *acceleration principle* is helpful in explaining these fluctuations. As applied to plant and equipment investment, the principle states, first, that fluctuations in product sales will be magnified into larger fluctuations in investment. Second, a *decline in the rate of increase* of sales can cause an absolute decline in investment. The acceleration principle is applicable also to investment in housing and in business inventories.

3. On this and other grounds one can readily explain why, once an upswing is underway, it will build up momentum and continue for some time in the same direction. It is harder to explain the *turning points*, particularly the upper turning point. Review the section on the end of prosperity for some clues on this matter.

4. Whether a downswing will be mild or severe depends partly on whether it occurs during a rising or falling phase of the longer cycle in building construction, and partly on whether there is a large and dependable volume of autonomous investment resulting from major innovations.

5. We need never expect another downswing as severe and prolonged as that of 1929–33, but we we may well see sharper drops than those of 1946 to date.

6. A simple method of *barometric forecasting* involves the use of leading series which typically turn up or down in advance of general business. But this method is not entirely dependable; and at best it predicts only the *date* of turning points, not the *magnitude* of upward or downward movements.

7. A simple method of *analytical forecasting* involves the following steps: make an independent estimate of government spending, business investment, exports and imports; add in knowledge about the

tion function to get a consistent estimate of consumer spending and GNP; cross-check this projection in various ways and, if you discover weaknesses, go through the first two steps again; when you are satisfied with the forecast of *money GNP*, convert this to a forecast of *real GNP* by estimating the probable change in the price level.

8. *Econometric forecasting*, which involves constructing a set of equations to determine the main components of GNP, can in principle yield more precise results than cruder methods. Forecasting accuracy depends, however, on the skill used in constructing the model and on the extent to which future relations among variables in the economy resemble those which have prevailed in the past.

DISCUSSION QUESTIONS

1. Which *kinds of spending* fluctuate most and which fluctuate least? What *products* show widest output fluctuations? What do these products have in common?
2. Once an upswing is under way, why does it build up momentum and continue for some time in the same direction? Can you use similar reasoning to explain why a downswing, once started, is bound to continue for some time?
3. What kinds of change in spending most commonly precipitate a downturn? In what sense, if at all, are such downturns inevitable? Couldn't they be postponed indefinitely by proper use of monetary fiscal policy?
4. Once a downturn has occurred, is there any "natural bottom" to the decline? What determines where this will be?
5. Comparing the American economy today with the period before 1940, would you say the economy is *no* more stable? *Moderately* more stable? *Much* more stable? Explain.
6. Take the most recent turning point which has occurred in the economy at the time you read this chapter. Look up each of the leading series listed in Table 3 and determine *their* turning points. How helpful would they have been in predicting the turning point in general economic activity?
7. Try your hand at a simple analytical forecast of GNP for the next four calendar quarters.
8. Another forecasting method, not discussed in the text, is the so-called "naïve method." This assumes that what has been happening in the immediate past will continue to happen in the immediate future—if GNP has been rising at 5 percent a year, it will continue to rise at this rate. What's wrong with this? Could one expect to do much better by fancier methods?